
1.0 Introduction

In this section	Section	Page	
	1.1	Introduction	1-2
	1.2	Definitions	1-3
	1.3	Acknowledgements	1-4
	1.4	Technical approval and certification procedures	1-4
	1.5	References	1-4

1.1 Introduction

This *Bridge manual* sets out the criteria for the design and evaluation of bridges, culverts, stock underpasses and subways and the design of earthworks and retaining structures. The manual is a companion document to the overarching *Highway structures design guide*⁽¹⁾, which provides general and specific design criteria for all highway structures.

The manual has been developed by Waka Kotahi NZ Transport Agency (NZTA) for use on state highways or for the design of other new or replacement bridges proposed for funding from the National Land Transport Fund (NLTf). Use of the manual on other highways, including private highways, may be considered appropriate with the agreement of the relevant road controlling authority, client or landowner.

Specifically the *Bridge manual* covers:

- bridges carrying road and/or pedestrian traffic, in which the main supporting members are of reinforced or prestressed concrete, structural steel, timber or aluminium, utilising beam or arch action, and spanning up to 100 metres
- stock underpasses and pedestrian subways
- all culverts or multiple culverts with a total waterway area greater than 3.4m², referred to herein as 'major culverts'
- slopes, embankments and cuttings
- retaining wall systems such as gravity walls, cantilever walls, mechanically stabilised earth walls and anchored walls.

The manual does not include suspension or cable-stayed bridge structures, nor structures subject to railway loadings.

The manual also does not specifically cover all forms of "other highway structures", such as sign gantries, sign supports, lighting supports, noise walls and fences. Details for these structures can be found in the *Highway structures design guide*⁽¹⁾.

The *Bridge manual* has been written as a performance specification, and methods have only been specified where they are considered essential to achieving a satisfactory design.

1.1 continued

This edition of the *Bridge manual* supersedes the following previously published documents:

1933	<i>Road bridges: Loads and allowable stresses</i> , Public Works Department.
1943	<i>Highway bridge design loadings and tentative preliminary code</i> , Technical Memorandum No. 8, Public Works Department.
1956	<i>Bridge manual</i> , Ministry of Works.
1971, 1972, 1973, 1978	<i>Highway bridge design brief</i> , CDP 701, Ministry of Works and Development.
1973	<i>Bridge classification and deck grading for overweight permits</i> , CDP 703, Ministry of Works and Development.
1974	<i>Posting weight limits for highway bridges</i> , CDP 704, Ministry of Works and Development.
1984	<i>Bridge deck widths and side protection</i> , CDP 710, Ministry of Works and Development.
1989	<i>Bridge manual</i> , National Roads Board.
1991	<i>Bridge manual: Design and evaluation</i> , (draft for comment), Transit New Zealand.
1994, 2000	<i>Bridge manual</i> , 1 st edition, Transit New Zealand.
2003	<i>Bridge manual</i> , 2 nd edition, Transit New Zealand.

1.2 Definitions

The following definitions shall be used preferentially in the naming of and reference to bridges and other highway structures on the state highway network:

Term	Definition
Bridge	A structure designed to carry a road or path over an obstacle by spanning it.
Culvert	One or more adjacent pipes or enclosed channels for conveying surface water or a stream below formation level. (Note that a culvert or multiple culverts with a total waterway area greater than 3.4m ² is referred to herein as a major culvert, where any distinction is required. This distinction is not required for naming purposes.)
Overpass	A grade separation where the subject carriageway passes over an intersecting carriageway or railway.
Stock underpass	A structure constructed to permit the passage of stock beneath a road.
Subway	A structure constructed to permit the passage of pedestrians, cyclists or equestrians beneath the road.
Underpass	A grade separation where the subject carriageway passes under an intersecting carriageway or railway.

1.3 Acknowledgements

The assistance provided by Beca, WSP, D Kirkcaldie Consulting Limited and John Wood Consulting in the preparation of this manual is acknowledged. The contributions made by the late Professor Nigel Priestley, Professor Misko Cubrinovski and the University of Auckland under Professor Bruce Melville in the development of aspects of sections 5 and 6 are also acknowledged.

The assistance provided by Bloxam Burnett & Olliver Limited and RoadLab Limited in the review of this manual is acknowledged.

Review of section 6 by the Waka Kotahi NZ Transport Agency Geotechnical Forum is acknowledged.

Section B3.2 contains text taken from AS 5100.1-2004 *Bridge design* part 1 Scope and general principles⁽²⁾. Reprinted with the permission of Standards Australia Limited.

1.4 Technical approval and certification procedures

Details of the technical approval and certification procedures required by Waka Kotahi NZ Transport Agency for highway structures on state highways are contained within appendix A of the *Highway structures design guide*⁽¹⁾. Details of the requirements for structure options reports, structure design statements, design certification, design review certification, construction certification and construction review certification are contained therein.

1.5 References

-
- (1) Waka Kotahi NZ Transport Agency (2016) *Highway structures design guide*. Wellington.
 - (2) Standards Australia AS 5100.1-2004 *Bridge design*. Part 1 Scope and general principles. Superseded.
-